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Identifying Berry Antioxidants That Help Fight Cancer

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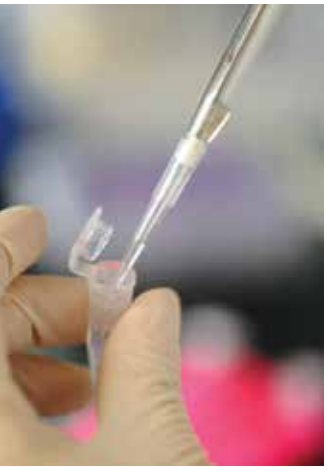
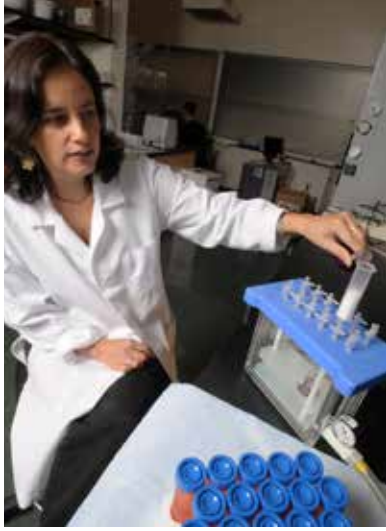
BACKGROUND Antioxidants in many fruits and vegetables help protect them from damage due to unfavorable environmental conditions or from attacks by insects, bacteria, fungi, and other pests. Through decades of research, health professionals have determined that, when included in the diet, these antioxidants may also help protect humans against common diseases associated with age such as cardiovascular disease and various cancers. Strawberries, raspberries, blackberries, and blueberries are among the 50 highest antioxidant-containing foods in the American diet, both by weight and on a per serving basis. Berry antioxidants belong primarily to a class of health-beneficial compounds known as polyphenols. There are several hundred different polyphenols in berries, and they can affect berries' appearance, flavor, and other quality attributes, as well as the health benefits received from eating them.





OBJECTIVES

The goal for this research was to develop a method by which researchers could identify specific polyphenolic compounds in a complex mixture and their optimum relative proportions that are responsible for the health-benefits of berries. Investigators assembled a team of scientists from a variety of backgrounds, including horticulturists, plant physiologists, chemists, and food scientists. The underlying hypothesis was that variability in composition among berry samples would result in variable biological responses in living tissues with respect to the disease process. Using sophisticated tools of chemistry, biology, medicine, and statistics, the team screened large numbers of black raspberry samples and compared chemical differences with disease responses. Ohio is the second-largest black raspberry producer in the U.S., so the research had potential economic implications as well.

Investigators developed mathematical models to match the ability of black raspberry extracts to prevent the growth of human colon cancer cells with the amount of individual polyphenolic compounds in each extract. Black raspberries have been extensively examined by medical scientists at The Ohio State University College of Medicine and the College of Dentistry for their beneficial effects against cancers of the mouth, throat, and digestive system. Research has progressed to initial clinical trials with cancer patients; these trials have recently been completed or are underway. Human colon cancer cell assays were chosen for the model because they can be cultured with relative ease, and much has been published about the assay procedure in the scientific literature.

IMPACTS

The study has produced information that is important from both biological and medical perspectives. From a biological standpoint, it has advanced scientists' understanding of the impact of plant extracts on cancer cell growth. All extracts significantly inhibited the growth of specific colon cancer cells, with varying effects depending on the dose. From a medical perspective, this information can be used to ensure the potency and reproducibility of products developed to clinically treat specific cancers of the mouth, esophagus, and colon.

These results will also be important for black raspberry producers nationwide, as the United States currently ranks third among the world's raspberry producers and exporters. By selectively choosing varieties and managing growing and handling methods, producers may have the opportunity to optimize levels of specific beneficial compounds, and thus, provide a product for the consumer with the greatest health benefits. In addition, the method is adaptable. The same technique could be used to determine the important compounds driving any system where variability in sample chemistry results in a variable biological response.

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